

INTRODUCTION

1. Purpose

Persons with pre-existing health conditions such as asthma or other chronic respiratory conditions and cardiovascular disease, or people 65 years of age or older, infants and children, pregnant women and smokers are particularly sensitive to smoke. Particulate matter (PM) in smoke poses the greatest risk to public health. The potential health effects vary depending on the size of the particles.

This document is intended to provide guidance for the state and federal agencies in Washington who respond to severe smoke episodes caused by large or long duration wildfires. The goal of these organizations during these incidents is to provide a coordinated response to mitigate impacts on public health. This document also identifies organizations, partners, and other governmental entities (county, city, and tribal) that state and federal responders need to coordinate with during these episodes. For all parties, this document provides a general concept of operations for coordinating multi-jurisdictional response to smoke from wildfires and may be useful for other hazardous air quality incidents. This document is focused specifically on smoke/air quality impacts and not on other risks posed by the fire or other hazard. The intent is to guide resource decisions related to air quality impacts of major wildfires or other hazards and does not replace, interfere with, or limit any action taken by a public agency in the course of performing its official duties.

As mentioned in Appendix 5 – Air Quality Response, and in accordance with Title VI of the Civil Rights Act of 1964, the Department of Health (Department) will ensure that people with limited English proficiency have meaningful access to the Department's services, and that no customer experiences discrimination on the basis of race, color or national origin.

The Department recognizes that language and cultural factors affect health outcomes, access to services, and access to information.

The Department commits to taking reasonable steps to provide effective and understandable public information and warnings messages to Limited English Proficient (LEP) communities during a public health emergency. (For more information review DOH's Culturally and Linguistically Appropriate Services (CLAS) Plan and Public Information Annex 3 to the DOH Emergency Response Plan-Basic).

2. Agency/Organization Contact List

This document is used by, but is not limited to the following agencies, organizations, and offices:

Table 1

AGENCY OR ORGANIZATION	
Federal	
1. Federal Land Managers (FLM): Includes U.S. Forest Service (USFS), Bureau of Land Management (BLM), National Park Service (NPS), and Fish & Wildlife Service	Region 6 headquarters in Portland (Forest Service and BLM), Wildland Fire Sciences Lab in Seattle (USFS WA contact).
2. Federal Emergency Management Agency (FEMA)	Region 10 office in Bothell, WA
3. Environmental Protection Agency (EPA)	Region 10 office in Seattle, WA
4. U.S. Health and Human Services (HHS)	Region 10 office in Seattle, WA
National	
5. Air Resource Advisor (ARA)	TBD: assigned to major Washington Wildfires by USFS Air National Smoke Management Specialists
6. The American Red Cross (ARC)	Regional office located in Seattle with 10 local chapters throughout the state.
State	
7. Washington State Department of Ecology (Ecology)	Ecology Headquarters in Lacey and Regional offices in Lacey, Bellevue, Yakima, and Spokane
8. Washington State Department of Health (DOH)	Headquarters located in Tumwater, WA
9. Washington Military Department, Emergency Management Division (EMD)	Department Headquarters in Camp Murray, WA
10. Washington State Department of Labor and Industries (L&I)	WA L&I Headquarters located in Olympia, regional offices around the state.
11. Washington State Department of Natural Resources (DNR)	Agency located in Olympia
12. State Fire Marshal	Located in Olympia
13. Washington State Patrol (WSP)	Located in Olympia
14. Washington Governor's Office	Located in Olympia
Local	
15. County Health Department	In county affected by WF smoke. See Tab 1 – Washington Contact List for contact information.
16. Local Clean Air Agencies (LAA)	In county affected by wildfire smoke. See Tab 1 – Washington Contact List for contact information.
17. School Districts	In county affected by wildfire smoke. See Tab 1 – Washington Contact List for contact information.
18. City and local government	Affected by wildfire smoke. See Tab 1 – Washington Contact List for contact information.
Tribal	
19. Tribal Government	Any tribal lands affected by wildfire smoke. See Tab 1 – Washington Contact List for contact information.

3. Agency Areas of Expertise and Involvement

Table 2 identifies each agency that may be involved, their general area of expertise, and their anticipated level of involvement during a wildfire smoke incident or hazardous air quality incident.

Table 2

CONTACT AGENCY OR ORGANIZATION	General area of expertise/assistance	Anticipated level of involvement
Federal		
1. Federal Land Managers (FLM) e.g., USFS & BLM	Wildfire suppression/containment, ensure Incident Management Team (IMT) is on the ground; may provide wildfire status updates, and public outreach/coordination.	Extensive – depends on size of a wildland fire, often the lead agency.
2. FEMA	Federal response agency for natural disasters.	Low, unless smoke levels and fire danger pose an extreme threat.
3. EPA Region 10 Federal Air Rules for Reservations (FARR) Program	Coordination with tribes related to air quality on tribal lands	Depends on extent wildfire smoke is impacting tribal lands.
National		
4. ARA – reports to IMT and/or the Air Resource Agency Administrator	Technical Specialist who often works as part of an IMT during major wildfires. ARAs may also work from a remote office and be assigned to a local federal agency office. Expertise in air quality mobile monitoring and modeling and addressing public health, transportation safety, and firefighter safety.	Extensive when deployed– newly created position provides assistance to incidents, and facilitates state response to air quality impacts from major wildland fires.
5. Incident Management Team (IMT)	Overall management of firefighting plans, operations, logistics, and community issues when wildfires become larger and more complex than can be handled by local resources. ARAs may be ordered by and assigned to an IMT.	Extensive during wildfire incidents but primarily deals with managing the wildfire. ARAs who are integrated with IMTs deal with the smoke issues.
6. ARC	Providing aid and assistance for natural disasters. Mass Care support for clean air shelters, feeding, and distributing relief supplies.	Depends on severity of smoke impact and risk to public health.

CONTACT AGENCY OR ORGANIZATION	General area of expertise/assistance	Anticipated level of involvement
State		
7. DOH	Coordinates the state-level ESF 8 response when assistance is requested by one or more impacted jurisdiction or tribe. Provides public health and medical communication and guidance as appropriate for the situation. Provides scientific and technical support to other coordinating agencies. Assists health agencies with health messaging related to air quality and assists with public outreach and education.	May be extensive during periods of elevated smoke levels. Depends on wildfire severity and extent to which local health officials need assistance, or where no local health authority is in place.
8. Ecology	Maintains real-time air quality monitoring data from an existing monitor network and relays monitored data to the public via Ecology's website (see Section 11 of this document). Ecology is not the lead agency, but upon request and if resources are available may assist in providing air quality forecasting and supplemental temporary monitoring. Coordinates with other agencies as needed.	May be extensive during periods of elevated smoke levels.
9. EMD	Coordinates response and recovery with state emergency support functions and local emergency services agencies and organizations.	Depends on severity and specific requests by local emergency management agencies for state assets. High involvement if Governor proclaims state of emergency.
10. L&I	Coordinates responder and workplace health and safety issues during emergencies or disasters. Can supply indoor air quality monitors for businesses and schools.	Depends on severity and specific requests for worker protection.
11. DNR	Wildfire suppression/containment, ensure qualified IMTs provide oversight to firefighting efforts; may provide wildfire status updates, and public outreach/coordination.	Primary response to fire danger and suppression, less on smoke risk to community. Assist with providing updated fire info to forecasting and health agencies.
12. WA State Fire Marshal	Assists in response to fire danger, coordinates with local fire officials.	Primary response to fire danger and suppression, less on public smoke exposure risk
13. DES	Assists in procuring facilities and resources to respond to the incident.	Depends on severity and specific requests for facilities or resources.
14. WSP	Facilitate the movement of emergency medical resources over state highways to locations identified by public health authorities.	Depends on severity and specific requests for medical resource movement.

CONTACT AGENCY OR ORGANIZATION	General area of expertise/assistance	Anticipated level of involvement
15. WA Governor's Office	Coordinates state-level policy issues with multiple agencies, especially if Governor proclaims a state of emergency.	Update on as-needed basis, unless state of emergency is proclaimed.
Local		
16. Local Health Jurisdiction	Notify public and media of health risks from smoke or hazardous air quality. Coordinates with local school administration on decisions regarding school activities and school closures. Coordinates with other community organizations on decisions to cancel or limit other public events. May make recommendations on or distribute N95 particulate filter masks to populations of impacted areas. Maintain awareness of health impacts occurring in the community. Coordinate with Ecology, DOH, Firefighting agencies (DNR and State Fire Marshal), and L&I.	Extensive during periods of unhealthy to hazardous smoke levels.
17. Local Air Agencies (LAA)	In coordination with Ecology maintains real-time air quality monitoring data within their jurisdiction from an existing monitor network and relays monitored data to the public via Ecology website (see section 11 of this document). LAAs are not the lead agencies, but upon request and if resources are available, may assist in providing air quality forecasting and supplemental temporary monitoring. Coordinates with other agencies as needed.	Depends on the extent wildfire smoke is impacting counties with LAAs.
18. School Districts	With assistance, determine if student health at risk, need to cancel school events, or announce school closures.	On as-needed basis during periods of unhealthy to hazardous smoke levels.
19. Healthcare Organizations	Treating patients who present with illnesses related to smoke or hazardous air. Make individual recommendations to patients, regarding risk and strategies for reducing risk. Communicate situational information and impacts to local health jurisdictions.	Extensive during periods of unhealthy to hazardous smoke levels.
20. City and local government	With assistance from local health agencies, determine health risk to community, public safety, need to cancel outdoor events, notify local businesses, alert fire and police.	On as-needed basis during periods of unhealthy to hazardous smoke levels.

CONTACT AGENCY OR ORGANIZATION	General area of expertise/assistance	Anticipated level of involvement
CONTACT AGENCY OR ORGANIZATION	General area of expertise/assistance	Anticipated level of involvement
Tribal		
21. Tribal Government	Coordination with above agencies. Similar role to #16 and #20 above.	Can be extensive if wildland fire smoke impact levels are unhealthy to hazardous within tribal communities.

4. Agency Actions and Desired Outcome

Table 3 describes the different actions and assistance needed during major wildfire incidents, the agency or organization expected to take such action, and the desired outcome.

Table 3

ACTION NEEDED	Lead agency and action taken	Desired Outcome
1. Air Monitoring		
Measuring ambient air quality	Ecology and LAAs responsible for existing WA Air Monitoring Network. IMTs and ARA may provide additional temporary monitoring resources and equipment via local and national cache. Ecology and LAAs may assist with providing additional temporary monitoring if resources are available and requested by a Local Health Jurisdiction.	Ability to track ambient air quality levels in communities receiving the heaviest impact.
Indoor air quality exposure	L&I is lead agency to supply indoor air monitoring for workers' health and safety. Local Health Jurisdictions with assistance from DOH can provide advice to schools or other venues upon request.	Ability to monitor indoor smoke levels in work environments, healthcare settings, and schools.
2. Air Quality Forecasting and Modeling		
Air quality forecast and modeling	ARA assigned to wildfire coordinates smoke dispersion forecasts and modeling. If no ARA assigned to wildfire, willing agencies listed in this document may coordinate available resources to help provide air quality forecast and modeling during large wildfire episodes.	Provide advance notice of possible smoke movement and impacts; improve public notification, and lower risk of public exposure to high smoke levels.
3. Issuing Health Warnings		
Providing public with frequent smoke updates on potential health risk and recommended public health actions via the web and media	Local Health Jurisdictions have primary responsibility for issuing Public Health Warnings with coordination between DOH, local government, ARA, and tribes	Frequent coordinated updates provided to the public via Washington Smoke Blog, DOH, and local government websites, press releases, and outreach to TV and print media.
4. Website management		
Updating the Washington Smoke Blog website wasmoke.blogspot.com (see description under #6 below)	Blog website managed by USFS and updated by WA Smoke Blog maintenance team comprised of willing members of the key agencies involved in the wildfire smoke response.	Provide the public with comprehensive "one-stop" website on wildfire status, air quality levels, health risk, press releases, and other critical info.

ACTION NEEDED	Lead agency and action taken	Desired Outcome
Updating state agency and local websites	Managed by respective agency. Supplements the Washington Smoke Blog	Complements the above website.
5. Public Actions		
Cancel or modify public events, outdoor and business activities. Consult with schools on limited hours or closure.	Decision made at the local or tribal level by government or school authorities, after consulting with Local Health Jurisdiction, ARA, DOH, IMT, and possibly L&I with smoke forecasts provided by willing agencies.	Prompt action taken, via notification of media and posting info on WA Smoke blog website and other relevant websites.
Set up public clean air shelters, assist schools or other public buildings in protecting from smoke.	Red Cross in the lead for setting up public clean air shelters. Decisions about protecting schools and public buildings made at tribal and local level. Assistance to above by IMT, ARA, DOH, and potentially L&I.	When determined necessary, prompt action taken to set up clean air shelters or identify measures for protecting schools and public buildings from smoke.
Recommended evacuation/relocation of sensitive populations.	Decision made at local level by emergency management, local health jurisdiction or tribal government, in consultation with ARA, DOH, IMT, and possibly L&I with smoke forecasts from willing agencies.	Prompt action taken if dangerous smoke levels expected to persist for a prolonged period. Requires close communication with DOH, affected Local Health Jurisdictions, IMTs, and possibly EMD, ARC, and WSP.

5. Recommended Public Health Actions, Based on Level and Anticipated Duration of Exposure to Wildfire Smoke and Other Severe Smoke Episodes

Wildfire smoke is a mixture of gases and fine particles which can irritate eyes and respiratory systems and worsen chronic heart and lung diseases. The quantity and duration of smoke exposure, as well as a person's age and degree of susceptibility, play a role in determining whether someone will experience smoke-related health problems. The potential health effects vary depending on the size of the particles. Particles larger than 10 micrometers usually irritate only the eyes, nose, and throat. Particles smaller than 2.5 micrometers (**PM_{2.5}**) can be inhaled deeply into the lungs, which increases the risk of cardiovascular and respiratory problems. When smoke levels are high, even healthy people may experience symptoms.

Table 4 is designed for use by affected Local Health Jurisdictions in consultation with DOH and other agencies that are parties to this document. The table identifies recommended public health actions to be taken, based on the intensity and expected duration of smoke exposure. Decisions about which public health actions to recommend should be based on available monitoring data and the projected smoke or hazardous air duration.

In the absence of any PM_{2.5} monitoring data, a visual evaluation can be made by using the visibility index (based on the viewing distance). This index is referred to as the "5-3-1 Visibility Index" and is a rough tool for estimating smoke levels. It can be heavily influenced by moisture in the air and angle of the sun so the Health Advisory Category Index and 5-3-1 Visibility Index are intended to be used together in identifying the public health risk and mitigation actions.

Whether or not the listed actions in Table 4 should actually be taken at various PM_{2.5} levels depends on additional factors in the bulleted list below the table. As air quality worsens, recommended public health actions for better air quality categories should also be implemented. For example, if the air quality is considered "unhealthy," then actions should be followed for "unhealthy for sensitive groups," "moderate" and "good" air quality days.

Table 4 Recommended Public Health Actions		
Health Advisory Category	Sensitive Populations or Short Durations	Extended Smoke Duration
Good	If smoke incident is forecasted in your area, review the Washington Wildfire Response document for Severe Smoke Episodes, Frequently Asked Questions about Wildfire Smoke and Public Health (FAQ) webpage, and more health tips on the Washington State Department of Health wildfire webpage. The WA Smoke Blog has information about current air quality and wildfire information: http://wasmoke.blogspot.com/ .	
Moderate	<ul style="list-style-type: none"> - Distribute information (i.e., FAQ) to public health partners and the public. - Focus on identifying and getting information to vulnerable populations. - Refer people to the WA Smoke Blog for more information. 	<ul style="list-style-type: none"> - Distribute information (i.e., FAQ) to public health partners and the public. - Respond to media inquiries. - Refer people to the WA Smoke Blog for more information.
Unhealthy for Sensitive Groups	Above, plus: <ul style="list-style-type: none"> - Issue a press release, outlining sensitive groups and encouraging them to reduce exposure. (Use the FAQ document for guidance.) - If school is in session, refer to <i>Public Health Guidance for School Outdoor Activities during Wildfire Events</i>. 	Above, plus: <ul style="list-style-type: none"> - Issue a press release outlining sensitive groups and encouraging them to reduce exposure. (Use FAQ document for guidance.) - In the release, include consideration of spending time in a clean air setting in the community (i.e., air conditioned library) or leaving the area until air quality improves. - If school is in session, refer to <i>Public Health Guidance for School Outdoor Activities during Wildfire Events</i>. - Consider opening a clean air shelter for sensitive groups.
Unhealthy	Above, plus: <ul style="list-style-type: none"> - Consider cancelling outdoor public events. - Recommend public limit strenuous outdoor activities. - Recommend that sensitive groups shelter-in-place, spend time in a clean air setting in the community (i.e., air conditioned library) or consider leaving the area until air quality improves. 	Above, plus: <ul style="list-style-type: none"> - Consider cancelling outdoor events. - Recommend public limit strenuous outdoor activities. - Recommend that sensitive groups shelter-in-place, spend time in a clean air setting in the community (i.e., air conditioned library) or consider leaving the area until air quality improves. - Open and publicize clean air shelters for sensitive groups.

Table 4 Recommended Public Health Actions		
Health Advisory Category	Sensitive Populations or Short Durations	Extended Smoke Duration
Very Unhealthy	Above, plus: - Cancel outdoor public events. - If school is in session, discuss school closure with school administrators. - Recommend shelter-in-place for general population. - Share info about periods of improved air quality to guide essential outdoor activity and ventilation of dwellings (refer to DOH FAQ for more info).	Above, plus: - Cancel outdoor public events - If school is in session, discuss school closure with school administrators. - Recommend shelter-in-place for general population. - Share info about periods of improved air quality to guide essential outdoor activity and ventilation of dwellings (refer to FAQ for more info). - Open and publicize clean air shelters for the general public.
Hazardous	Above, plus: - Recommend voluntary evacuation for sensitive groups.	Above, plus: - Recommend voluntary evacuation for the general public, especially sensitive groups (see DOH wildfire smoke FAQs for more info).

Considerations that may influence implementation of the above mitigation strategies:

- Clear/predictable fluctuations in air quality throughout the day can allow for modifications in the recommendations from the above table. For example, schools could delay recess instead of canceling it if there is a pattern of clearing in the afternoon. For another example, if clean air shelters are provided, they should be open and available at the times of day that smoke is heaviest (i.e., may be at night).
- If smoke is predicted to be heavy for short durations (i.e., a few hours) the public health messaging should be to encourage people to avoid spending time outdoors.
- Indoor air quality may be poor in older dwellings. These may include schools, community centers with care centers, nursing homes, or group homes. When air quality is “Unhealthy” for an extended smoke duration, it may be worthwhile to assess indoor air quality for these and other types of facilities where people who are sensitive to smoke live or stay. Some state agencies have air scrubbers available for indoor use in such dwellings.

Additional Resources-

- **WAQA-** <https://fortress.wa.gov/ecy/publications/publications/0802022.pdf>
- **AQI-** <http://airnow.gov/index.cfm?action=aqibasics.aqi>
- **Washington State Department of Health Wildfire webpage (FAQs):**
<http://www.doh.wa.gov/CommunityandEnvironment/AirQuality/OutdoorAir/SmokeFromFires/WildfireSmoke.aspx>
- **Wildfire fact sheet (translated into 7 languages):**
<http://www.doh.wa.gov/Emergencies/EmergencyPreparednessandResponse/Factsheets/Wildfires>

- **Public Health Guidance for School Outdoor Activities during Wildfire Events:**
<http://www.doh.wa.gov/Portals/1/Documents/Pubs/334-332.pdf>
- **Wildfire Smoke A Guide for Public Health Officials:**
<http://www.arb.ca.gov/carpa/toolkit/data-to-mes/wildfire-smoke-guide.pdf>
- **Protect yourself from Wildfire Smoke CDC:** <http://www.cdc.gov/features/wildfires/>

Using the Visibility 5-3-1 Index

Since wildfires often occur in remote areas, air monitoring equipment may not be available. Smoke levels can rise and fall rapidly, depending on weather factors including wind direction. Making visual observations using the 5-3-1 visibility index is a simple way of estimating if smoke levels are unhealthy and what precautions to take. While this method can be a useful tool, persons should always use caution and avoid going outside if visibility is limited, especially persons who may be sensitive to smoke.

The procedure for using this visibility index follows:

1. Determine the limit of your visual range by looking for distant targets or familiar landmarks such as mountains, mesas, hills, or buildings at known distances (miles). The visual range is that point at which these targets are no longer visible.
2. Ideally, the viewing of any distance targets should be made with the sun behind you. Looking into the sun or at an angle increases the ability of sunlight to reflect off of the smoke, thus making the visibility estimate less reliable.
3. Once distance has been determined, follow this simple guide:
 - If over 5 miles, the air quality is generally healthy, except possibly for smoke sensitive persons. The general public should be advised to avoid prolonged exposure if conditions are smoky to the point where visibility is in the 5-10 mile range. See recommended public health actions listed in Table 4.
 - If under 5 miles, the air quality is unhealthy for sensitive groups including young children, adults over age 65, pregnant women, and people with heart and/or lung disease, asthma or other respiratory illness. These people should minimize outdoor activity. See Table 4 Recommended Public Health Actions.
 - If under 3 miles, the air quality is unhealthy for everyone. Young children, adults over age 65, pregnant women, and people with heart and/or lung disease, asthma or other respiratory illness should avoid all outdoor activities. See Table 4 Recommended Public Health Actions.
 - If under 1 mile, the air quality is very unhealthy, and in some cases may be hazardous. Everyone should avoid all outdoor activities. See Table 4 Recommended Public Health Actions.

Table 5

Using the 5-3-1 Visibility Index			
Distance you can see*	And you are:		Or you have:
	<ul style="list-style-type: none">• An Adult• A Teenager• An older child	<ul style="list-style-type: none">• Age 65 & over• Pregnant• A young child	<ul style="list-style-type: none">• Asthma• Respiratory Illness• Lung or Heart Disease
5 miles	Check visibility	Minimize outdoor activity	
3 miles	Minimize outdoor activity	Stay Inside	
1 mile	Stay Inside	Stay Inside	
No matter how far you can see, if you feel like you are having health effects from smoke exposure, take extra care to stay inside or get to an area with better air quality. You should also see your doctor or other health professional as needed.			
* less reliable under high humidity conditions			

6. Air Resource Advisors (ARA)

Air Resource Advisors are trained personnel who are assigned by the USFA Air Resource Division. Air Resource Advisors are ordered by the Incident Management Teams in direct control of firefighting operations. Their primary duties include smoke forecasting, smoke monitoring, and direct communications with the IMTs regarding local air quality. ARAs also focus on monitoring smoke for firefighter exposure and working directly with Emergency Management personnel on visibility issues associated with public roadways. ARAs work directly with IMTs and partner agencies to facilitate public information dissemination. Agencies and local jurisdictions making requests for ARA mobilization should make the request directly to the US Forest Service contacts listed in Tab 1 of the WA Contact List.

7. Washington “Smoke Blog” Website

As noted in Table 2 under Website Management, a major tool for providing the public with current air quality and health information on wildfires is the Washington Smoke Blog. This blog site can provide timely “one-stop information” by including links to the various agency websites, and providing critical information on wildfire status, air quality conditions and forecasts, school and activity closures, burn bans, location of clean air shelters, and travel restrictions due to visibility. This blog would be activated by the US Forest Service, and managed by a team of willing state, federal, tribal and local agencies. The link to this blog site is <http://wasmoke.blogspot.com/>.

8. Annual Pre-Wildfire Season Conference Call

Each year prior to the summer wildfire season, in May or June, representatives from the agencies, organizations, or offices listed in this document should hold a conference call in preparation for the upcoming season. The purpose of this call would be to review the information in this document, discuss any specific preparation needs for the summer, and update the contact list of staff expected to be using this document if major wildfires occur. This contact list is provided in Tab 1.

9. As-Needed Wildfire Conference Calls and Briefings

Similar to the above pre-season conference call, routine conference calls will be held during periods of major wildfire incidents for the purpose of briefing the parties identified in this document. These conference calls and briefings can be requested by any party. They will include updates on the status

of major on-going wildfires and an opportunity to discuss current conditions related to air quality, local health impacts, smoke forecasts, recommended public actions, communications, emergency actions such as evacuation, and other issues important to the group. These briefings will include a wildfire status update from public information officers (if available) associated with Incident Command, and any ARA assigned to the wildfire.

Ecology is the lead state agency for coordinating these calls, while the USFS contact listed in this document may coordinate the calls if requested. DOH may also provide assistance in coordinating these calls if needed. For major wildfires in neighboring states or provinces (Oregon, Idaho, and Canada) that are impacting Washington, the briefing will include the appropriate contacts in those states who have essential information on the smoke impact from the wildfire(s).

In situations where a smaller group conference call is needed, such as between state and local health officials to discuss specific local public health issues, or with Ecology to discuss air quality levels in areas impacted by wildfire smoke, such calls will be convened as needed. Requests for such calls should be made to either Ecology or DOH, depending on the primary topic of concern.

10. Indoor Air Monitoring Equipment

Wildfire smoke can also affect indoor air quality in private businesses and public buildings such as schools and offices. Research has shown that when there are heavy outdoor smoke levels, a significant amount of smoke can still infiltrate indoors, even with all of the windows and doors closed. Many commercial buildings and schools mechanically draw in the outdoor air through air filtration systems. However, standard HVAC air filters will not remove most of the ultra-fine smoke particles. More information on use of air filters, cleaners, and other ways to reduce indoor smoke levels can be found in the document cited below, *Wildfire Smoke: A Guide for Public Officials (Version 8)*.

There are different types of indoor air monitors that can be used to indicate the potential health risk when indoors. This monitoring equipment is generally focused on PM_{2.5}, but also carbon monoxide. Indoor monitoring equipment is typically less expensive than outdoor equipment, and can provide the same measurements in real-time data in micrograms per cubic meter (µg/m³), via handheld or portable monitors. These monitors can be purchased, or in some cases rented, during wildfire smoke incidents. The following is a brief overview of the types of affordable indoor air monitors available, some features, and costs.

Examples of indoor monitors

1. EVM-3 Real-time direct reading particulate monitor. Provides real-time particulate concentrations, along with temperature and relative humidity measurements. Optional sensors are available for CO and 8 other toxic gases. Other models EVM-4 and EVM-7 (includes CO sensor).
EVM-3 Purchasing Cost: \$4000-\$5000 - Rental Cost: \$750/wk to \$2250/mo (EVM-7)
Operating Cost: low maintenance
2. Met One Aerosol Mass Monitor 831. Least expensive indoor particulate monitor. Also can provide real-time concentrations. Handheld and more portable than EVM monitors. No option for adding CO monitoring. Purchasing Cost: About \$1500 - Rental Cost: not known if available to rent
Operating Cost: low maintenance
3. Thermo Scientific Personal Data RAM™ pDR-1000AN. Another real-time particulate monitor. Has an alarm feature when a certain exposure level is reached. About the same size as the Met One 831, but more expensive. Purchasing Cost: About \$5000 - Rental Cost: about \$600/mo

Operating Cost: low maintenance

11. Other references, resources, and links

Wildfire Smoke: A Guide for Public Officials (Version 8). The smoke exposure levels listed above in Table 4 are adapted from the guidance document, *Wildfire Smoke: A Guide for Public Health Officials*. This document is currently used in many states as a reference guide for how public agencies can best protect public health during wildfire incidents. In addition to providing background information on the composition of smoke, potential health effects, and recommended actions, it contains specific strategies on how to reduce smoke exposure, such as indoor air filters and cleaners, use of masks and respirators, setting up clean air shelters, and examples of public service announcements for wildfire. This document is referenced here as general guidance to provide additional information, and like this document, is not intended to replace, interfere with, or limit any action taken by a public agency in the course of performing its official duties, nor does it represent a legally binding document.

Wildfire- related websites. In addition to the Washington Smoke Blog described above, these web links can provide current information on wildfire activity:

- InciWeb (Incident Information System): www.inciweb.org/
- Northwest Coordination Center (NWCC): www.nwccweb.us/index.aspx
- DNR: <http://www.dnr.wa.gov/recreationeducation/firepreventionassistance/pages/home.aspx>
- USFS fire map: <http://activefiremaps.fs.fed.us/>
- National Weather Service smoke/air quality maps:
<http://airquality.weather.gov/sectors/pacnorthwest.php#tabs>
- DOH Wildfire Smoke website
<http://www.doh.wa.gov/CommunityandEnvironment/AirQuality/OutdoorAir/SmokeFromFires/WildfireSmoke.aspx>
- Ecology: <https://fortress.wa.gov/ecy/enviwa/Default.ltr.aspx>
- EPA AIRNow website: www.airnow.gov/

Washington Webcams The following are links to live webcams, which can be used to view wildfire smoke conditions around the state. However, many are designed to show only traffic and road conditions, and do not provide very good image resolution for viewing smoke. Some are much better than others.

- **Washington Department of Transportation**
 - **Traffic Cams** <http://www.wsdot.wa.gov/traffic/Cameras/default.aspx>
 - **Airport Cams** <http://www.wsdot.wa.gov/aviation/WebCam/default.htm>
- **Washington State Webcams.** The state of Washington has an extensive web cam network. Washington web cams provide views of local ski areas, Seattle, Spokane, Puget Sound, the San Juan Islands and many other places in the state.
<http://www.northwestwebcams.com/washington-web-cams.shtm>
- **The Weather Underground.** This weather website has a webcams directory that allows the user to zoom in on Washington to see live images around the state, both transportation and general views: www.wunderground.com/webcams
- **US Forest Service, Air Quality, Real Time Images.** This website currently provides only two live webcams in WA – Pasayten Wilderness and the eastern part of the Columbia River Gorge – but both provide high resolution images: www.fsvisimages.com/descriptions.aspx

Map of High Wildfire Risk Areas in Washington. A map of the areas in Washington that have a greater potential for major wildfire, prepared by DNR, and can be found at this link
http://www.dnr.wa.gov/Publications/rp_burn_communitiesatrisk.pdf

Materials on Health Effects of Wildfire Smoke. DOH maintains fact sheets with general information about the health effects of wildfire smoke and strategies to minimize these effects:
<http://www.doh.wa.gov/CommunityandEnvironment/AirQuality/OutdoorAir/SmokeFromFires/WildfireSmoke.aspx>

Air Pollution and School Activities: <http://www.doh.wa.gov/Portals/1/Documents/Pubs/334-332.pdf>

12. Tabs

Current Agency Contact List. Tab 1 is a contact list of representatives from the agencies and organizations identified in this document. Annual updating of this contact list will be necessary, and should be conducted at the annual pre-wildfire season conference call, as noted in #8.

Examples of Wildfire Smoke Public Announcements. Tab 2 provides examples of two public announcement/press releases, which can be used as a guide for future announcements.

Tab 1
Washington Contact List

CONTACT AGENCY OR ORGANIZATION	STAFF NAME and POSITION	CONTACT PHONE/EMAIL
1. US Forest Service	Janice Peterson , <i>Pacific Northwest Region, Forestry Sciences Lab, Washington Zone Coordinator</i> Rick Graw , <i>Pacific Northwest Region, Regional Air Resource Specialist</i> Willie Begay , <i>Pacific Northwest Region, Smoke Management Specialist</i>	jlpeterson@fs.fed.us (206)732-7845 rgraw@fs.fed.us (503)808-2918 wbegay@fs.fed.us (503)808-2390
2. FEMA	Walt Robinson <i>FMAGP (*needs review by FEMA)</i>	walt.robinson@fema.dhs.gov
3. EPA	Steve Scott , <i>Region 10, Federal Air Rules for Reservations (FARR) Burn Ban Lead</i>	scott.steve@epa.wa.gov (206)553-0692
4. Air Resource Advisor - National Coordinator	Pete Lahm - USFS Smoke Program Management in WA DC (ARAs can be requested when a major smoke incident occurs)	pete.lahm@gmail.com (202)205-1084
5. Red Cross	n/a (depends on chapter and WILDFIRE location)	n/a
6. Washington State Department of Health (DOH)	DOH 24/7 Duty Officer – Tumwater	hanalert@doh.wa.gov (360)888-0838
7. Washington State Dept. of Ecology Air Quality Program	Camille St. Onge - <i>Program Communications Manager, Olympia</i> Cullen Stephenson - <i>Technical Services Manager, Olympia</i> Ranil Dhammapala - <i>Forecaster, Olympia</i> Clint Bowman - <i>Forecaster, Olympia</i> Sean M Hopkins - <i>Smoke Team, Yakima</i> Joye Redfield Wilder - <i>PIO, Yakima</i> Kary Peterson - <i>Smoke Team, Spokane</i> Brooke Beeler - <i>PIO, Spokane</i>	camille.st.onge@ecy.wa.gov (360)407-6822 cullen.stephenson@ecy.wa.gov (360)407-6807 ranil.dhammapala@ecy.wa.gov (360)407-6807 clint.bowman@ecy.wa.gov (360)407-6815 sean.hopkins@ecy.wa.gov (509)575-2804 jred461@ecy.wa.gov (509)575-2610 kary.peterson@ecy.wa.gov (509)329-3523 brook.beeler@ecy.wa.gov (509)329-3478

CONTACT AGENCY OR ORGANIZATION	STAFF NAME and POSITION	CONTACT PHONE/EMAIL
8. Washington Military Department, Office of Emergency Management (EMD)	State Emergency Operations Officers (SEOO) on Duty EMD Duty Officer – Camp Murray	stateemergency.operationsofficer@mil.wa.gov 24-hour emergency line (800)258-5990
9. Washington State Department of Labor and Industries (L&I)	Scott Loerts – Risk and Safety Manager, Olympia	scott.loerts@lni.wa.gov (360)902-5740 (360)791-0816 cell
10. Washington State Department of Natural Resources (DNR)	DNR Region Office responsible for fire (Northeast, Southeast, Northwest, South Puget, Pacific Cascade, or Olympic). See Region and Districts, then Regional contact.	Region and Districts: http://www.dnr.wa.gov/about/dnr-regions-and-districts Regional Contacts: http://www.dnr.wa.gov/contact-us
11. Washington State Fire Marshall	Chuck Duffy	firemarsh@wsp.wa.gov (360)596-3900
12. Washington State Local Clean Air Agencies	http://www.ecy.wa.gov/programs/air/local.html	See contacts from website links
13. Local Health Jurisdictions	Contact DOH Duty Officer	hanalert@doh.wa.gov (360)888-0838
14. Tribal Government	Contact DOH Duty Officer	hanalert@doh.wa.gov (360)888-0838

The attached links route to agency or organization web sites. They do not provide the actual contacts for wildfire smoke and air quality issues.

Tab 2

Example 1 of Wildfire Smoke Public Announcement News Release

For release: *date*

Contacts: *names, phone numbers*

[Agency name] Urges Washingtonians to Protect Themselves from Wildfire Smoke

Its wildfire season in Washington and smoke could be on the way. [Agency name] advises people to take precautions to protect themselves from unhealthy smoke levels.

Wildfire season is underway with *[xx wildfires]* currently burning in the state. Under certain weather conditions smoke from these fires can drift into communities and quickly cause unhealthy air quality. Should smoke incidents occur, *[agency name]* and health officials urge local residents to take the following precautions to avoid breathing problems or other symptoms from smoke:

- ☐ Be aware of smoke concentrations in your area and avoid the places with highest concentrations.
- ☐ Avoid smoke either by leaving the area or protecting yourself by staying indoors, closing all windows and doors and using a filter in your heating/cooling system that removes very fine particulate matter.
- ☐ Avoid strenuous outdoor activity in smoky conditions.
- ☐ People suffering from asthma or other respiratory problems should follow their breathing management plans or contact their healthcare providers.

Remember, local smoke levels can rise and fall rapidly, depending on weather factors including wind direction. People can conduct a visual assessment of smoke levels to quickly get a sense of air quality levels and take precautions. If people have additional concerns, they should contact the nearest regional or local public health agency for the latest in health conditions from smoke.

More information about the health effects of wildfire smoke is available from the Washington Department of Health at:

<http://www.doh.wa.gov/CommunityandEnvironment/AirQuality/OutdoorAir/SmokeFromFires.aspx>.

More information on the Washington Air Quality Advisory (WAQA) designations is available at:

<https://fortress.wa.gov/ecy/publications/publications/0802022.pdf>.

For more information about local conditions:

- ☐ Visit the [Washington Smoke Blog](#) for more information regarding active fires and air quality, along with tools to help people assess smoke levels in their area.
- ☐ Tune to local radio and TV stations and the Weather Channel in affected areas that may include the very latest fire information in news programming and weather reports.

Example 2 of Wildfire Smoke Public Announcement

News Release

For release: *date*

Contacts: *names, phone numbers*

Smoke From *[wildfire name]* Creates Hazardous Air Quality

Calm winds and a temperature inversion caused smoke concentrations to reach hazardous levels between 4 a.m. and 8 a.m. today. Conditions improved as daytime temperatures increased, but very smoky conditions could return early Wednesday morning.

The *[wildfire]*, xx miles from *[location/city]* sent dense smoke into the town in the early morning hours today. Calm conditions and a temperature inversion caused smoke from the fire to settle in at ground level between 3 a.m. and 9 a.m. Smoke concentrations at the air quality monitor in *[city]* reached hazardous levels during this time.

[Agency name] urges everyone to avoid outdoor exertion during such conditions. People with respiratory or heart disease, the elderly and children should remain indoors.

The National Weather Service predicts that calm conditions, a high pressure system and nighttime temperature inversions could cause very smoky mornings through Saturday. Conditions are expected to improve as daytime temperatures rise and the smoke lifts away from ground level.

However, under certain weather conditions wildfire smoke can drift into communities and quickly cause unhealthy air quality. Should additional smoke incidents occur, *[agency name]* and health officials urge local residents to take the following precautions to avoid breathing problems or other symptoms from smoke:

- ☐ Be aware of smoke concentrations in your area.
- ☐ Avoid smoke by staying indoors, closing all windows and doors, setting air conditioners to recirculation, and using a filter in a heating/cooling system that removes very fine particulate matter. If possible, avoid smoky areas.
- ☐ Avoid strenuous outdoor activity including sports practice, work and recreation.
- ☐ People with concerns about health issues, including those suffering from asthma or other respiratory problems should follow their breathing management plans or contact their healthcare providers.

Remember, local smoke levels can rise and fall rapidly, depending on weather factors including wind direction. People can conduct a visual assessment of smoke levels to quickly get a sense of air quality levels and take precautions. If people have additional concerns, they should contact the nearest regional or local public health agency for the latest in health conditions from smoke.

More information about the health effects of wildfire smoke is available from the Washington Department of Health at:
<http://www.doh.wa.gov/CommunityandEnvironment/AirQuality/OutdoorAir/SmokeFromFires.aspx>.

More information on the Washington Air Quality Advisory (WAQA) designations is available at:
<https://fortress.wa.gov/ecy/publications/publications/0802022.pdf>.

For more information about local conditions:

- ☐ Visit the [Washington Smoke Blog](#) for more information regarding active fires and air quality, along with tools to help people assess smoke levels in their area.
- ☐ Tune to local radio and TV stations and the Weather Channel in affected areas that may include the very latest fire information in news programming and weather reports.
- ☐ Obtain a dedicated NOAA Weather Radio receiver, which will alert you 24 hours a day to hazards in your area.